REMARKS

Rejections under 35 U.S.C. §102(b)

In the Advisory Action of September 3, 2004, the Examiner maintains the rejection with the assertion that Applicants' arguments that Sato fails to disclose the feature of a semiconductor is insufficient because "a semiconductor is a material that conducts more than an insulator but less than a conductor." The Examiner further states that, "the term is relative and has no specific value" and that the materials of Sato et al. are "semiconductors." Applicants again traverse this rejection and reconsideration and withdrawal thereof are respectfully requested.

As a first point the Examiner very briefly has stated that any of the compounds of Sato may be semiconductors depending upon what is deemed to be the insulator at issue and the conductor at issue. The Examiner then states that the term semiconductor is relative and has no specific value. However, this last assertion regarding the meaning of semiconductor incorrect and an gross oversimplification of semicoductors.

"Semiconductor" has a well-accepted meaning in the electronics field. Every solid material or element (or compound of elements) has its own characteristic energy band structure. The variation in the band structure is responsible for the variation of the electrical characteristics that are observed with the various materials. To understand the mechanism of current flow in solids, the electrons, which are set into

movement, by an applied electric field, must be able to move into new energy states. This implies that there must be empty energy states available to the electrons. For instance, if a few electrons reside in an otherwise empty energy band, a large number of unoccupied states are available into which the electrons can move. The lower energy band is called the valence band and the upper energy band is called the conduction band and these are separated by a gap.

With an "insulator", the lowest energy band or valence band is filled and separated from the conducting band by the band gap, thus containing no allowed energy states. At absolute zero (0 K) a semiconductor material behaves exactly like an insulator. However, the difference between a semiconductor material and an insulator is that the size of band gap is much smaller in the semiconductor than in an insulation. Thus, the electrons in semiconductors may be excited from the valance band to the conduction band by a relatively small input amount of thermal and optical energy. As a result, at room temperature a semiconductor with a small band gap will have a significant number of electrons that are excited thermally across the gap into the conduction band, but the insulators having a large band gap will remain insulating at room temperature. The difference between a material that may act as a semiconductor and materials that typically act as insulators is that the number of electrons for conduction can be significantly increased in the semiconductor material by thermal or optical energy.

In metals, the energy bands either overlap or are only partially filled. Electrons and empty energy states are intermixed within the bands so the electrons can move freely under the influence of the applied electric field and metals thus have a high electrical conductivity.

While the Examiner is correct that a semiconductor does have the ability to conduct less than strong conductors but more than strong insulators, a "semiconductor" in addition to having the ability to function in a particular way, must also actually function in a particular manner to be defined as a "semiconductor." There is no such functional component in Sato.

For example, tetracyanoquinodimethan (TCNQ), which is disclosed in Sato, can change from very low conductivity to very high conductivity under the influence of particular electromagnetic, thermal, or external electric fields. Thus, TCNQ, has the potential to have semiconducting properties under certain circumstances. However, TCNQ is not a semiconductor in Sato because is is not functioning as such in the device of Sato. According to Sato, alternating layers of acceptor and donor materials are stacked between electrodes and the application of external energy such as an electric field and/or light results in a charge transfer between at least some of the donor and acceptor molecules inside the organic thin film.

As stated in Sato at col. 2, lines 30-35, "this charge transfer causes a change in absorption spectra or conductivity of the film to bring about positive and negative polarities in the

film, thereby providing functional devices such as display devices, rectifiers, switching devices or light-memory devices". Thus, Sato does not have a semiconductor.

In the present invention, however, a charge transfer material, which either may be a donor or an acceptor, is used for making the charge injection in the active semiconductor of the device more efficient. Whether the charge transfer material is a donor or acceptor, it will form a charge transfer complex with a semiconductor, which itself is either an acceptor or donor. In other words, to form the charge transfer complex, the charge transfer materials must be either a donor or acceptor and the semiconductor must be the opposite. It will also be readily evident to persons skilled in the art that if a charge transfer material with donors is provided adjacent to a semiconductor material which also is a donor, the result will be an efficient insulation. In other words, combinations or charge transfer materials according to the present invention may form a charge transfer complex for the purpose of either injecting current into the active semiconductor of the semiconductor device or alternatively it may be used to isolate the active semiconductor electrically.

None of these features are present in Sato and it will be seen that the present invention concerns completely different subject matter and addresses the solution of completely different problem than is the case of Sato.

The present invention has the recited feature of a charge transfer complex is formed by providing a charge transfer material between the electrode and the semiconductor material and with properties tailored to the charge transfer properties of the semiconductor material itself. These features are not present in the device of Sato.

As the above-indicated remarks address and overcome the objections and rejections of the Examiner, withdrawal of the objections and rejections and allowance of the claims is respectfully requested.

Should the Examiner have any questions, regarding the present application, he is requested to please contact, MaryAnne Armstrong, PhD (Reg. No. 40,069) in the Washington DC area at (703) 205-8000.

Applicants respectfully request a three (3) month extension of time for filing the present response. The required fee is attached to the Notice of Appeal filed under separate receipt concurrently herewith.

Docket No. 3672-0111P
App. No. 09/763,948

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully submitted,

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